

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

Issued March 11, 1911.

U. S. DEPARTMENT OF AGRICULTURE.

FARMERS' BULLETIN 431.

THE PEANUT.

BY

W. R. BEATTIE,

Assistant Horticulturist, Bureau of Plant Industry.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1911.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
OFFICE OF THE CHIEF,
Washington, D. C., December 24, 1910.

SIR: I have the honor to transmit herewith a manuscript entitled "The Peanut," by Mr. W. R. Beattie, Assistant Horticulturist, and recommend that it be published as a Farmers' Bulletin, to supersede the former publication, entitled "Peanuts", issued as Bulletin No. 356 of the same series. During the past two years the methods of production and the uses of peanuts have so changed and increased as to call for the issuance of a new bulletin.

The peanut is rapidly becoming an important farm crop throughout the Southern States. Its vines are valuable as forage and the peas that are not marketable can be used for feeding purposes. Throughout the boll-weevil district of the cotton belt the peanut promises to become of importance as a money crop, and special oil-producing varieties will doubtless assist in keeping the oil mills of the Southern States supplied with raw materials.

Respectfully,

WM. A. TAYLOR,
Acting Chief of Bureau.

HON. JAMES WILSON,
Secretary of Agriculture.

CONTENTS.

	Page.
Introduction.....	5
Soil and climatic requirements of the peanut.....	6
Preparation of the soil.....	8
Time for plowing.....	8
Depth of plowing.....	8
Preparation for planting.....	8
Fertilizers and preparatory crops.....	9
Cropping system and green manures.....	9
The use of stable manure.....	10
Commercial fertilizers.....	10
Importance of lime in the soil.....	11
The peanut as a nitrogen gatherer.....	12
The seed and its selection.....	12
Importance of planting good seed.....	12
Improvement by selection.....	12
Planting shelled or whole seed.....	12
Time and methods of planting.....	14
Time of planting.....	14
Distance to plant.....	15
Quantity of seed required.....	15
Depth to cover the seed.....	15
Tools and methods of planting.....	16
General cultivation.....	16
Method of cultivation.....	16
Tools adapted to cultivating peanuts.....	17
Harvesting.....	17
Proper time for digging the crop.....	17
Methods employed for lifting the plants.....	18
Curing process and care of crop after digging.....	19
Picking and cleaning.....	22
Time of picking.....	22
Picking by hand.....	23
Use of machines for picking.....	23
Care of peanuts after picking.....	24
Preparation of peanuts for market.....	25
Methods of cleaning peanuts in the factory.....	26
Cleaned vines as stock feed.....	26
Varieties of peanuts.....	26
Classification of types.....	26
Descriptions of varieties.....	28
Virginia Bunch.....	28
Virginia Runner.....	28
Spanish.....	29
Tennessee Red.....	29
Valencia.....	29
African, or North Carolina.....	29

Varieties of peanuts—Continued.		Page.
Varieties for marketing.....		30
Varieties for stock feeding.....		30
The uses of the peanut.....		30
Important uses for human food.....		30
The uses of peanut by-products as foods for live stock.....		32
Possibilities in the manufacture of peanut oil.....		33
Use of the peanut on the farm.....		34
Growing importance.....		34
The value of peanut hay for feeding purposes.....		35
The value of the entire peanut plant as forage.....		35
The use of peanuts for fattening hogs.....		36
Methods of handling and curing peanuts for forage.....		36
Insects injurious to the peanut.....		37
Diseases of the peanut.....		37
Conclusions.....		38

ILLUSTRATIONS.

	Page.
FIG. 1. Map of the United States, showing the area adapted to the production of peanuts.....	7
2. Disk plow adapted for fitting land for growing peanuts.....	8
3. Harrow adapted for smoothing and pulverizing land.....	9
4. Roots of peanut vine, showing the value of this plant as a nitrogen gatherer.....	13
5. Machine for marking land and sowing fertilizer.....	14
6. One-horse peanut planter.....	15
7. One-horse cultivator.....	17
8. Plow type of peanut digger.....	18
9. Machine potato digger in use in digging peanuts.....	19
10. Machine potato digger adapted for harvesting peanuts.....	20
11. Stakes around which stacks of peanut vines are to be built.....	21
12. Laborer building a stack of peanut vines, showing method used.....	22
13. Peanut stacks placed close together near farmyard.....	23
14. Picking peanuts from the vines by hand.....	24
15. An improved type of peanut-picking machine in operation.....	25
16. Commercial types of peanuts.....	27
17. Virginia Bunch type of peanut.....	28
18. Spanish type of peanut.....	29
19. Peanuts growing in the alleys between rows of corn.....	34
20. Disease appearing upon the leaves of the peanut.....	38

THE PEANUT.

INTRODUCTION.

It is not definitely known when and where the peanut was first cultivated. Several allied species of plants are natives of Brazil, and there is every indication that the common peanut originally came from tropical America. Peanuts were introduced into the United States during the earlier days of colonization, but did not become of commercial importance until about 1870. From that time until 1897 the growth of the peanut industry was gradual, but a great increase in the production and use of peanuts has taken place during the last eight or ten years.

Botanically the peanut belongs to the same group of plants as do the beans and peas, but it possesses the character of maturing its fruit or nut beneath the surface of the soil rather than above ground, as do most other leguminous plants. The technical name of the peanut is *Arachis hypogea*, the name indicating the characteristic habit of the plant to mature its fruits underground. The peanut is known under the local names of "goober," "goober pea," "pindar," "ground pea," and "groundnut." The names "goober" and "goober pea" are more properly applied to an allied species having no true stem and only one pea in each pod which has been introduced and is frequently found growing wild in the Gulf Coast States. Properly speaking, the peanut is a pea rather than a nut, the term "nut" having been added on account of its flavor, which is similar to that of many of the true nuts.

The small yellow flowers of the peanut are borne in the little pocket where the leaves are attached to the stems, and as soon as pollination has taken place the visible portion of the flower fades and falls, after which the short, thick stem that supports the lower portion of the flower elongates and the sharp-pointed ovary is thrust downward into the soil, where the pod develops. Should the ovary fail to reach or penetrate the soil no pod will be formed.

The value of the commercial peanut crop of the United States for the year 1908 was estimated at \$12,000,000. During recent years

the area of production of peanuts has greatly increased, especially throughout the warmer parts of the country. The value of the peanut, both as a money crop and for feeding on the farm, renders it especially desirable as a part of the rotation wherever conditions suitable to its development exist.

Most persons think of the peanut as it appears for sale at the news and fruit stands, but during recent years many new lines of consumption have been found. In addition to the great quantity of peanuts sold in the shell each year, thousands of bushels are shelled for use in the manufacture of confections and food products.

It is the purpose of this bulletin to give full cultural directions for growing this crop, together with some of the uses of the peanut. The peanut is well adapted for use as a part of the cropping system in the Southern States, especially on the cotton and tobacco lands. Soils that will not produce more than one-fourth of a bale of cotton to the acre can be made to yield a fair crop of peanuts at a very low cost for growing. Comparatively few persons realize the value of peanuts when used as a farm crop, especially when the product is fed to live stock on the farm and eventually returned to the soil in the form of manure.

SOIL AND CLIMATIC REQUIREMENTS OF THE PEANUT.

The soil best suited to the peanut is one of a sandy, loamy nature, preferably light or grayish in color rather than dark. Soils that are dark and those carrying a considerable percentage of iron or other mineral are likely to stain the shells of the peanuts, thus rendering them less desirable for the trade. For use on the farm, however, the staining of the shells is of little consequence, as it does not materially injure them for stock feeding. In fact, soils that contain considerable clay and lime or are loamy in character produce heavier nuts and sometimes greater yields than do lighter soils. As a rule the peanut does best on a sandy loam with a well-drained clay subsoil, but the crop may be grown under a wide range of soil conditions. Soils that become hard or compact are not adapted to peanut growing, owing to the inability of the pod stems or "pegs" to penetrate the surface.

Soils that are poorly drained or sour are not suited to the peanut. The ideal soil consists of a sandy loam containing a reasonable amount of humus, or vegetable matter, together with an abundance of lime. A soil having a suitable mechanical consistency is the first essential. Soils lacking in fertility can be improved by a proper cropping system or by the judicious use of manures.

The cultivation of the peanut for commercial purposes has until recently been confined chiefly to areas in Virginia, Tennessee, the

Carolinas, and Georgia. During recent years the industry has become established throughout the South Atlantic States and westward to and including California. The territory indicated by the dark portion of the map shown as figure 1 is for the most part adapted to the production of peanuts for consumption on the farm; over a large part of this section a good grade of marketable nuts can be grown. This area, it will be observed, is one within which the frost-free season is comparatively long, and much of the territory has a soil containing a large percentage of sand or alluvial matter, making it easily cultivated and well adapted to the peculiar habits of the peanut plant. There are undoubtedly many sections outside of the area indicated on the map (fig. 1) that can be profitably devoted to the production

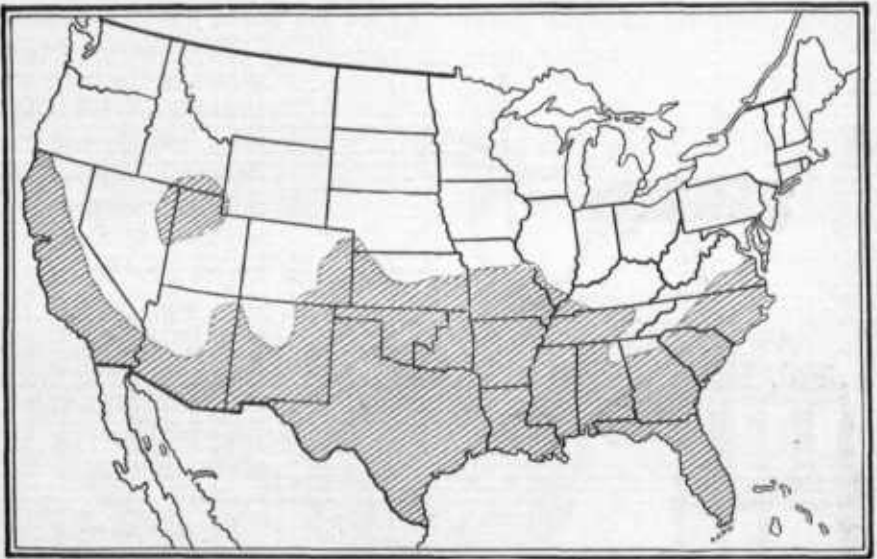


FIG. 1.—Map of the United States, showing the area adapted to the production of peanuts.

of peanuts for stock food, and a few regions where they can be grown commercially.

The climatic requirements of the peanut are a long season without frost, a comparatively light rainfall during the growing period, abundant sunshine, and a high temperature. The peanut is slightly more susceptible to injury from frost than the common bunch bean and requires a somewhat longer season for its development. The Spanish peanut will mature in ninety days under the most favorable conditions, but one hundred and ten to one hundred and twenty days should be allowed. The large-podded varieties require a longer period for best results.

PREPARATION OF THE SOIL.

Time for plowing.—The time for plowing the land to be planted to peanuts will depend somewhat upon its previous treatment. If the land has been in corn the previous season, and a soil-building crop planted in the corn, the plowing can be done during the winter or early in the spring after the cover crop has made considerable growth. Where the corn has been husked from the stalk and the stalks allowed to remain upon the ground, these, together with weeds and remains of the crop planted in the corn as a soil improver, should be dragged down and afterwards turned under with a disk plow. Any trash, such as corn or cotton stubble, remaining on the land will prove a menace to the cultivation of the peanut crop and it is essential that all such materials should be turned under in ample

time to decay before planting the land to peanuts. If the land is in sod it will be desirable to break it during autumn or winter. If there is no crop on the land the plowing need only be done in time for planting or a short time before planting, in order to allow the soil to settle.

Depth of plowing.

—The depth of plowing will depend somewhat upon the

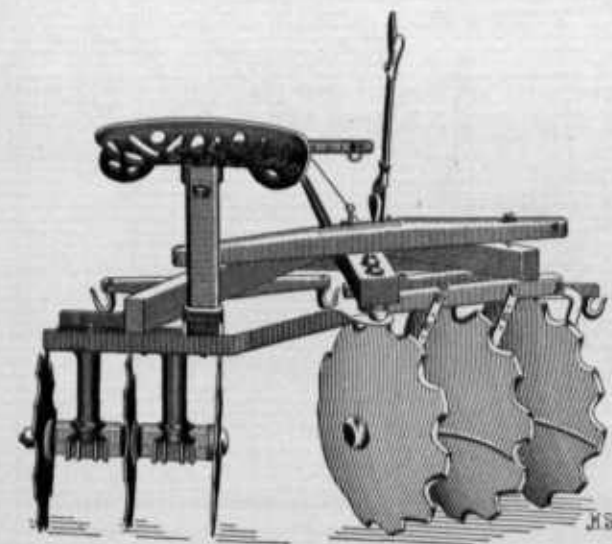


FIG. 2.—Disk plow adapted for fitting land for growing peanuts.

character and depth of the surface soil. On sandy soils that are underlain by a clay subsoil it would be unwise to bring a very great quantity of the subsoil to the surface. If the surface soil is not of sufficient depth, it should be increased by plowing a very little deeper each year until a sufficient depth is reached. As a general rule the depth of plowing for peanuts should be equal to that for corn in the same locality. From 5 to 7 inches of loose soil will be sufficient for the growing of all varieties of peanuts. Subsoiling may prove beneficial on soils having insufficient drainage.

Preparation for planting.—When the land is plowed but a short time before planting it should be harrowed within a few hours after

plowing, in order to prevent loss of moisture. On loose, sandy soils that are reasonably free from weeds or grass it is often possible to dispense with the regular plowing and cut the land with a disk harrow or disk plow. A tool that is especially adapted for this purpose is shown in figure 2. This implement both cuts and turns the soil, leaving it in fine condition, so that it is readily prepared for planting.

Where plowing is necessary in order to turn under sod, clover, or weeds a tool of the type shown in figure 3 is desirable for smoothing and pulverizing the soil afterwards. This harrow is superior to the ordinary smoothing harrow in that it turns, crushes, and levels the soil in one operation. By means of a lever the cutting blades can be set to any depth, and the weight of a boy or light man upon the seat is sufficient to secure good work. If the soil is very loose it may be necessary to roll or drag thoroughly before planting.

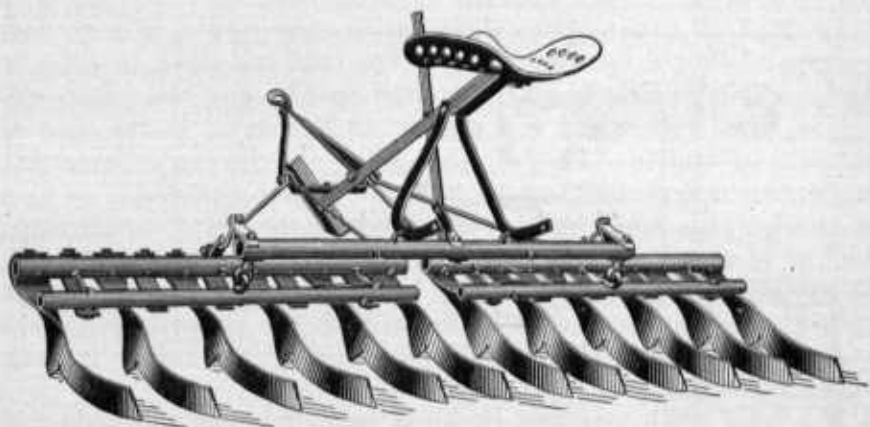


FIG. 3.—Harrow adapted for smoothing and pulverizing land.

Under ordinary circumstances level culture should be practiced, but where the drainage is poor it may be advisable to throw up slight ridges upon which to plant peanuts; this is especially desirable during a season of excessive rainfall. When ready for planting, the soil should be in the same general condition as that prepared for a crop of snap or bunch beans. Thorough preparation of the soil is profitable for all crops, and especially for peanuts. If the soil can be harrowed once a week for three or four weeks before planting, most of the weeds that would otherwise injure the crop will be destroyed.

FERTILIZERS AND PREPARATORY CROPS.

Cropping system and green manures.—Peanuts should be grown in rotation with other crops rather than as a specialty. The cropping system will depend somewhat upon the area of other crops grown,

but the arrangement should be such that the land will be planted to peanuts one year in each three or four. A good rotation is corn or cotton the first year with cowpeas, crimson clover, or bur clover planted between the rows at the time of the last cultivation; the next season plow under the cover crop and plant the land to peanuts; as soon as the peanuts are harvested sow the land with rye and use as a winter pasture; plow under the rye during the springtime and plant cowpeas, using the peas as a hog pasture during the autumn; then return to corn or cotton the following year. In order to get the greatest benefit from a crop of crimson or bur clover it should remain on the land in the spring until a heavy growth has been made. It is not desirable to plant peanuts immediately after turning under a heavy growth of clover, and planting should be deferred until the land has had sufficient time to settle and the green manure to decay partially, or a rotation should be followed in which the peanuts do not come upon the land until the following year.

In the Gulf Coast States the rotation may consist of corn and cowpeas, followed by winter oats. The oats will ripen in June or early in July, in time to grow a crop of Spanish peanuts. The next season, plant cotton and sow crimson or bur clover at the time of the final cultivation. The following spring, the clover may be turned under, the land planted to corn, and the rotation repeated.

Another plan would be to devote the land one year to sweet potatoes or to a crop of early Irish potatoes followed by cowpeas. In this rotation stable manure should be applied to the crop of corn or cotton, and the commercial fertilizers with the peanut and potato crops. Peanuts should, if possible, follow some well-cultivated crop which has been kept free from weeds.

The use of stable manure.—Stable or barnyard manure should not be used as a fertilizer the same year that the land is planted to peanuts, owing to the great number of weed seed that are contained in the manure. The use of manure also has a tendency to cause the plants to produce abnormal tops and a large percentage of poorly filled pods, known to the trade as "saps" or "pops." The proper time for applying stable manure is with the crop grown the previous season, thus giving it time to become incorporated with the soil and reduced to the proper condition for the peanut crop.

Commercial fertilizers.—The peanut responds to the use of commercial fertilizers. However, a reasonable amount of humus in the soil is essential. If properly handled, the peanut crop is not exhaustive of soil fertility; in fact, the plant is a great nitrogen gatherer, as may be observed by the large number of nodules upon the roots. On the other hand, if the entire plant, including the root, is removed and no part returned to the soil the peanut becomes almost

as exhaustive of soil fertility as corn. By feeding the straw and other refuse from the crop to cattle, hogs, and work animals and applying the manure thus obtained to the land the fertility may be retained or even increased.

The nitrogen-gathering bacteria are usually present in abundance, even where the crop is planted for the first time, but should the nodules not be abundant artificial inoculation would prove an advantage.

On soils that are adapted to the production of peanuts it will not be necessary to employ commercial fertilizers in large quantities. The alluvial and overflow lands found along the rivers of the Southwest seem to be well supplied with all the elements necessary for the production of peanuts. On the sandy hill lands of this region it will be necessary to add fertilizers and lime in varying quantities.

A commercial fertilizer adapted to the production of potatoes is as a rule suited for the growing of peanuts. A mixture which contains from 2 to 3 per cent of available nitrogen, 5 to 7 per cent of available phosphoric acid, and 6 to 10 per cent of potash is desirable; this should be applied at the rate of from 200 to 800 pounds to the acre, according to the needs of the land. Most growers follow the practice of scattering the fertilizer in a narrow strip where the row is to be planted, often using a one-horse fertilizer distributor for the purpose. It is important that the fertilizer be thoroughly mixed with the soil.

Importance of lime in the soil.—In order to insure the proper filling and ripening of the pods, peanuts require an abundance of lime in the soil. Where the soil is of a calcareous nature, containing limestone, shells, or lime in its more active form, it may not be necessary to make a regular application, but on soils that are deficient in lime or inclined to be in the least sour, from 600 to 1,000 pounds of fresh-burned lime should be applied to an acre every four or five years. The presence on the land of certain weeds, such as the common sorrel and the sedges (which have three-cornered stems), indicates sourness and insufficient drainage; to correct this an application of lime will be necessary in addition to ditching or tile draining. The lime should not be put on at the same time as the commercial fertilizers, but rather during the previous autumn, or at the time of plowing the land.

Where deposits of marl are found this may be used as a substitute for lime. In Virginia the marl is hauled and scattered broadcast upon the land during the winter months.

Wood ashes are desirable as a fertilizer for peanuts, as they contain both potash and lime. Unleached wood ashes may be applied broadcast at the rate of 1,000 to 1,200 pounds, 25 to 30 bushels, to the acre.

Lime should be used on land that is to be planted to peanuts, unless it is definitely known that there is an abundance of it already present. In the river valleys of the boll-weevil district there appears to be an abundance of lime present in the soil.

The peanut as a nitrogen gatherer.—The peanut plant, in common with other leguminous plants, has the power of collecting the free nitrogen of the atmosphere and storing it in little nodules upon its roots. For this reason the peanut is one of the more desirable of our soil-renovating and soil-improving plants. It should be borne in mind, however, that in order to benefit the soil the nitrogen so gathered should not be removed, but that the main portion of the roots should be left in the soil. Figure 4 shows the root of a peanut plant which is abundantly covered with the nitrogen-storing nodules.

THE SEED AND ITS SELECTION.

Importance of planting good seed.—A good grade of seed is just as important with the peanut as with corn, wheat, or any other crop. There is perhaps no other farm crop except corn that is so greatly influenced by the character of seed planted as the peanut. The very best peanuts of the previous season's crop should be selected for seed, and of these only the most mature and perfect peas should be used. Seed should be saved only from well-ripened and mature plants and should be properly cured and kept dry during the winter months. Good seed produces a more even stand of plants, which in itself returns a greater yield.

Improvement by selection.—The seed should not only be selected from plants that are mature, but from those producing a large number of mature pods as well. By doubling the number of well-filled pods on each plant the yield for each acre will also be doubled. Many millions of bushels have been added to the corn crop of the country simply through the selection and improvement of seed.

What has been done with corn is possible with the peanut, and where we now have an average yield of 34 bushels to the acre it is reasonable to expect this to be increased to 50 or 60 bushels through seed and cultural improvements.

Planting shelled or whole seed.—In planting the large-pod varieties it is desirable for several reasons that the seed be shelled. In the first place, the planting machines now in general use are adapted to handling the shelled seed only. Second, when planting whole pods there is always a doubt regarding their being well filled, and a poor stand may result. Third, pods containing two or more seeds will produce more than one plant in a hill, causing a waste of seed and a crowding together of the plants. Fourth, whole seed is slower in germinating than shelled seed. With the Spanish variety the case

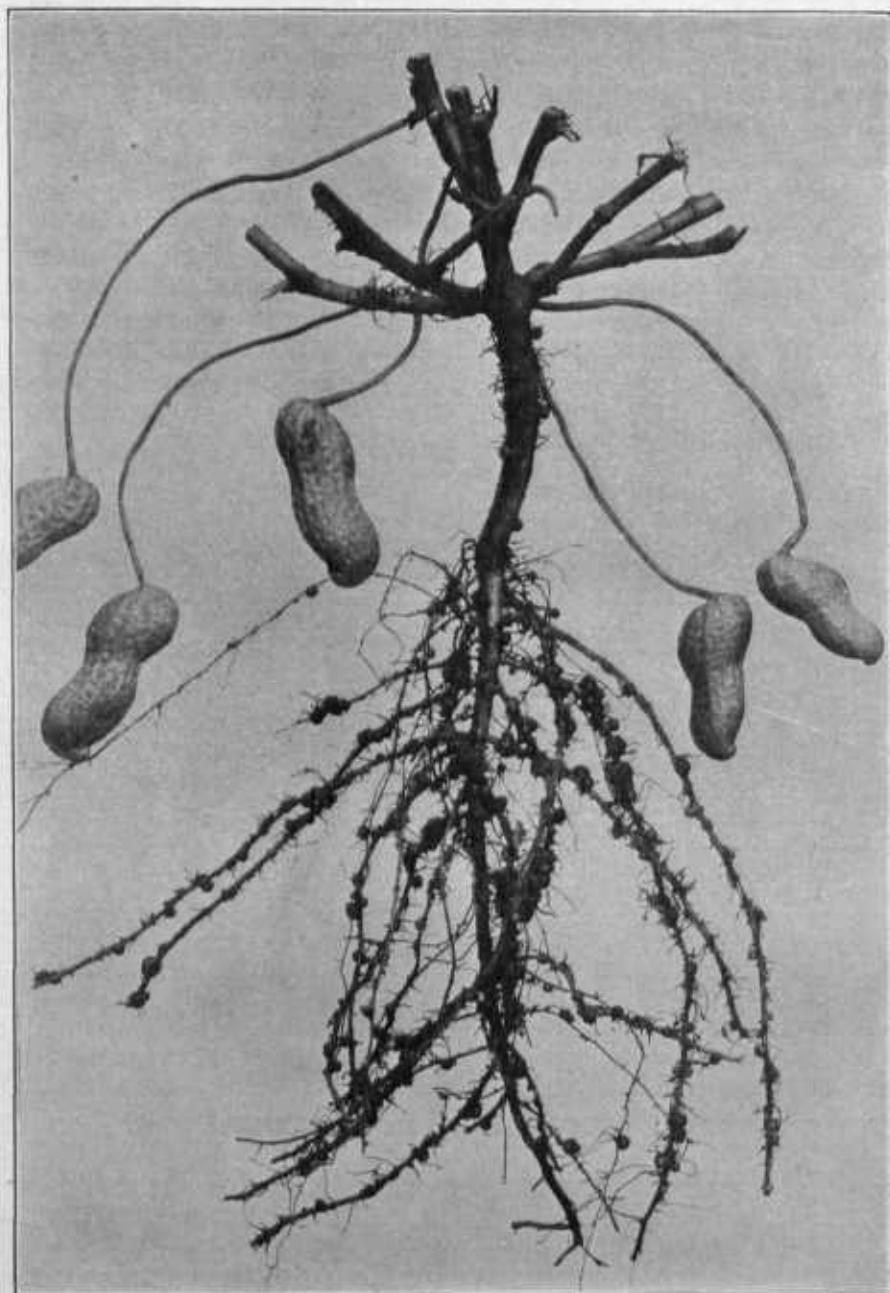


FIG. 4.—Roots of peanut vine, showing the value of this plant as a nitrogen gatherer. The nodules on the roots are formed by the bacteria which collect the nitrogen.

is quite different, as the pods are invariably filled, the crowding together of the plants is no great disadvantage, and the few days extra time required for germination is of little consequence.

Virginia nuts intended for seed should always be shelled by hand, but the Spanish are sometimes shelled by machinery, although their germination is invariably injured when so handled. Many growers of the Spanish peanut practice soaking the unshelled nuts in water previous to planting. Soaking for a few hours will hasten germination, but if for any reason the seed can not be planted immediately it will be lost. Shelled seed should never be soaked before planting.

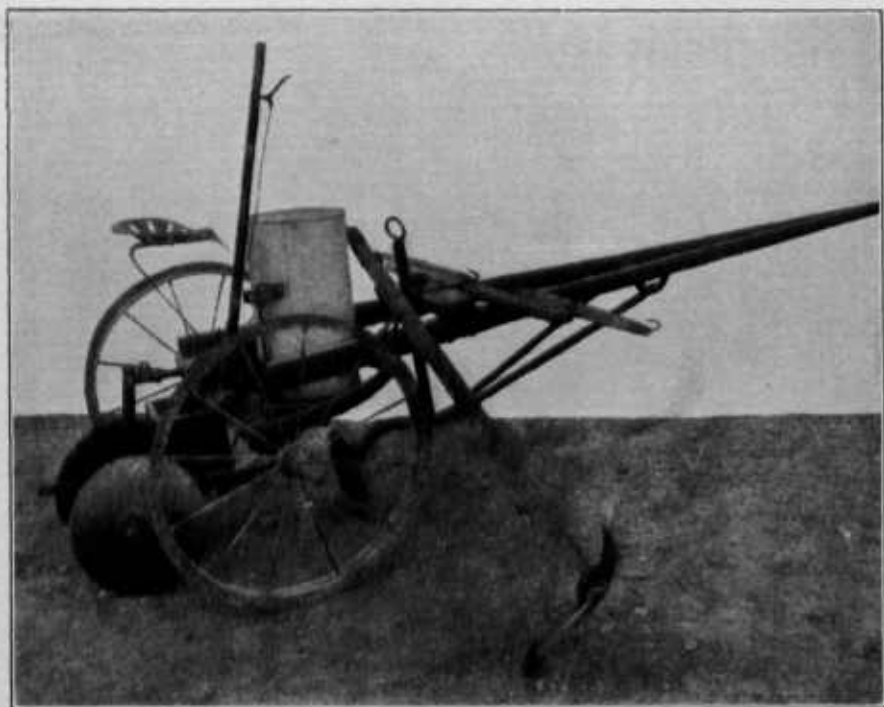


FIG. 5.—Machine for marking land and sowing fertilizer.

TIME AND METHODS OF PLANTING.

Time of planting.—The time for planting peanuts is in the spring after the soil has become thoroughly warm. In order to secure a good stand, the seed should not be put in the ground until there is sufficient warmth to germinate it quickly. As a rule peanuts should be planted a trifle later than corn and beans. The Spanish variety may be planted somewhat later than the Virginia type, as it requires less time to complete its growth.

As previously mentioned, the Spanish and similar varieties may in certain localities be planted after oats—that is, from the middle

of June to the 10th of July. The Virginias or large sorts should, if possible, be planted before May 20 for the best results.

Distance to plant.—A common distance between rows is 36 inches, but this varies somewhat according to the soil and variety. For the Virginia Runner variety on good soil the distance between rows should be at least 36 inches, and 16 inches between the plants in the rows. Virginia Bunch peanuts may be in rows as close together as 30 inches, and 9 to 12 inches apart in the rows. The Spanish and Tennessee Red varieties are planted in rows from 28 to 36 inches apart and 9 to 12 inches apart in the rows, according to the fertility of the soil. On rich soils, where the spread of vine will be great, the maximum distance between rows as well as between plants in the row should be allowed.

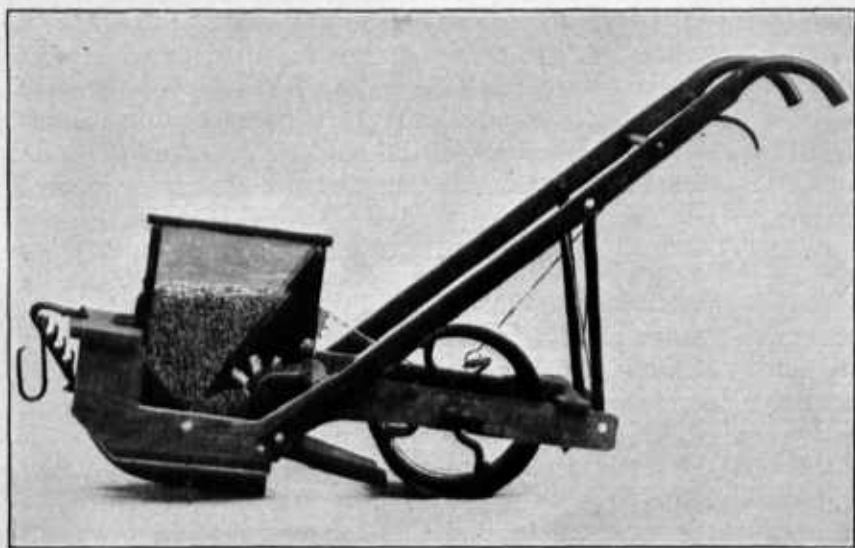


FIG. 6.—One-horse peanut planter.

Quantity of seed required.—The quantity of seed peanuts required to plant an acre will depend somewhat upon the distances of planting.

As a rule $1\frac{1}{2}$ pecks of shelled Virginia peas will plant an acre. One peck of shelled Spanish peanuts, or $1\frac{1}{4}$ bushels in the pods, are required for an acre. The greater the care exercised in planting, the smaller will be the waste of seed, and economy is quite an object when planting specially selected or high-priced seed. By planting the Spanish variety in the pod two seeds will be placed together in a hill, but there can be no very great objection to this, as the two plants will generally give a better yield than where the plants grow singly.

Depth to cover the seed.—The depth to which the seed should be covered will depend somewhat upon the character of the soil. On

heavy soils three-fourths inch to $1\frac{1}{4}$ inches will be sufficient, while on light sandy soils $1\frac{1}{2}$ to 2 inches may not be too deep.

Tools and methods of planting.—Peanuts are generally planted in rows that are cultivated in one direction only. Some growers follow the practice of first marking the land with an implement similar to the ordinary corn marker. Others open a furrow with a one-horse plow, then after the fertilizer has been distributed in the furrow the plow is again used and a slight ridge thrown up. There is now on the market a tool of the type shown in figure 5, which sows the fertilizer, throws up a slight ridge, and at the same time indicates the position of the next row.

The greater portion of the peanut crop is planted with the one-horse planters of the type shown in figure 6. These machines are similar in many respects to a cotton planter and cost about \$15 in most localities.

Where the Spanish and similar varieties are planted in the shell the usual method is to open a small furrow, drop the seed by hand, then cover it by means of a small harrow or cultivator with a notched board fastened across the back of the implement. Doubtless, satisfactory machines for planting in the shell will shortly be upon the market.

GENERAL CULTIVATION.

Method of cultivation.—Cultivation of the peanut crop should begin immediately after planting and continue until the vines occupy the ground. The work of cultivation should be pursued very much the same as for corn, beans, and all similar crops. Frequent shallow cultivation that will keep the soil loose and prevent the loss of moisture is essential. Shortly after rains the surface soil should be stirred and during dry weather a dust mulch maintained. During the later cultivations it will be desirable to work the soil toward the rows to provide a bed of loose earth in which the pods may form.

After the peanuts begin to "peg," or form pods, they should not be disturbed or given further cultivation. The old idea that the blossoms of the peanut must be covered is erroneous, although growers frequently allow considerable soil to be thrown over the vines during the final cultivation. For the last cultivation it is a common practice to employ a tool that will both throw the soil toward the rows and leave a furrow in the middle of the alley to carry off water during heavy rains.

Common crab-grass is one of the most troublesome weeds of the peanut fields, and it is often necessary to resort to hand hoeing in order to keep this and other weeds out of the rows. If the crop is kept well worked with horse tools, very little hand labor will be required.

Tools adapted to cultivating peanuts.—Most implements that are adapted to the cultivation of corn or cotton will be found suitable for handling the peanut crop. For the first two or three cultivations a one-horse weeder of special type may be used crosswise of the rows. After the plants are tall enough so the rows can be followed, a spring-tooth riding cultivator is desirable, while for the later workings the same implement can be used by changing the spring teeth for regular cultivator shovels. For one-horse cultivation the ordinary cotton sweep is frequently used, but the form of cultivator shown in figure 7 will do more efficient work. This implement is provided with several styles of narrow and broad shovels, sweeps, and hillers, making it possible to adapt it to the requirements of a wide range of conditions.

Some growers follow the practice of running a light roller over the plants after the final cultivation, the object being to flatten the stems upon the ground in order that the little pods forming on the extremities of the stems may reach the soil. This practice may increase the yield, but it will also increase the percentage of "saps," or unfilled pods, and it is doubtful if anything is gained by the practice.

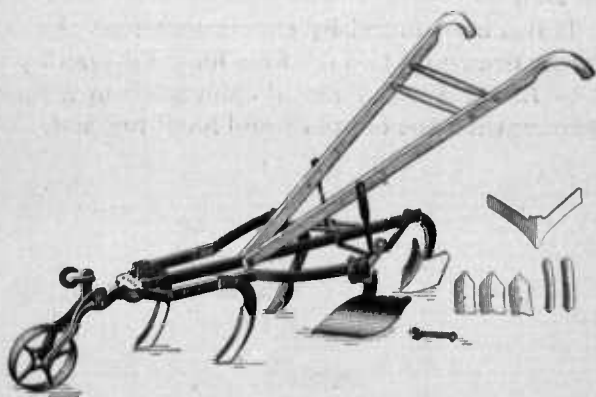


FIG. 7.—One-horse cultivator.

HARVESTING.

Proper time for digging the crop.—No fixed rule can be given by which to determine when to remove the peanut crop from the ground, and each grower must be his own judge in the matter. In general practice the growers aim to dig before the first frosts, in order that the peanut vines may have greater value for stock food. To the southward, where frosts do not appear until quite late, the vines assume a yellowish appearance during the latter part of the season, which indicates the ripening of the peas. If digging is deferred too long, the first-formed peas are likely to burst their shells and start growing; this is especially true if there is a period of rainy weather late in the season. The aim should be to dig at the time the vines have upon them the greatest number of mature peas. Where a large acreage is grown it will be necessary to begin harvesting as soon as

the earliest peas are ready, in order to complete the work before unfavorable weather sets in.

Methods employed for lifting the plants.—Under ordinary circumstances the peanut vines are plowed from the ground with a one-horse turning plow and afterwards separated from the soil by hand. Many growers employ either a two-horse plow similar to that frequently used for digging potatoes or a turning plow with the mold-board removed to prevent a furrow being turned. A digger of this type is shown in figure 8. Behind the digger or plow a gang of workmen shake the vines and peas free from the soil and throw them in small bunches. In this manner a team and driver accompanied by eight or ten hands will dig from 5 to 7 acres a day at a cost of about \$2.50 an acre.

It has been found by experiment that the regular machine potato digger drawn by two or three horses driven by one man will dig from 8 to 12 acres a day and do the work in a much cleaner and better manner than the old plow and hand method. This machine not only

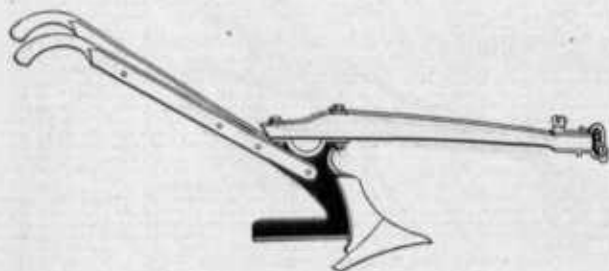


FIG. 8.—Plow type of peanut digger.

removes the peanuts from the ground in a more perfect manner but also shakes off the soil, leaving the vines lying loosely upon the surface of the ground. By the hand method a few pods become

detached from the vines, while with the machine potato digger scarcely a pod is lost. A machine of this character in operation is shown in figure 9. Another machine slightly different in design is shown in figure 10.

The cost of a machine potato digger is about \$75, but with proper care it should last many years. Almost any of the machine potato diggers may be used for digging peanuts, but where the vines of the "runner" peas are exceptionally heavy there may be some difficulty in getting the vines through the machine. This difficulty may be overcome by providing disks or cutters to cut away the ends of the vines in front of the machine.

Special machines are now being offered which are intended to dig, clean, and bunch the peanuts. By setting any of these machines to the proper depth it is possible to sever the main root of the peanut just below where the pods are formed and thus leave considerable of the accumulated nitrogen in the soil. It is estimated that the nitrogen left in the soil by this system has a fertilizing value of from \$3 to \$8 an acre.

Several local devices have been constructed, usually upon the plan of an ordinary plow, but having a U-shaped blade or cutter with one edge sharpened and so mounted that it may run underneath the peanut plants. It is desirable to use a double team, straddling the row, so that the digger will run at a uniform depth. Almost any blacksmith can construct a tool of this kind and it should not cost more than \$5 or \$6. Any device that will sever the roots of the peanut just below where the peas are formed will answer the purpose and prove better adapted to the work than the plow. Past methods



FIG. 9.—Machine potato digger in use in digging peanuts.

as practiced in Virginia, where the peanuts are removed by means of an ordinary plow, taking most of the nitrogen from the soil, are largely responsible for the rapid depletion of soil fertility in those lands.

Curing process and care of crop after digging.—After the peanut vines are loosened from the soil they are allowed to lie either spread upon the ground or in small bunches for three or four hours, and are then placed in small stacks around a central stake to cure. If the peas are allowed to lie exposed to the weather for any length of time after digging, the pods become discolored and lose in weight.

A better grade of peanut hay will be secured if the vines are placed in the small stacks as soon as the leaves and stems are thoroughly

free from dew or other surface moisture. Most growers follow the practice of putting the peas in stacks the same day they are removed from the soil, or those dug during the morning are stacked in the afternoon and those dug later in the day are stacked the following morning as soon as they are free from dew; however, any dew or rain will discolor the pods.

The essentials in caring for the crop during the curing period are that the peanuts be kept in small stacks, given an abundance of air, and protected from both the weather and injury from animals. Owing to the fleshy nature of the stems they cure quite slowly and are liable to mildew if placed in large lots.

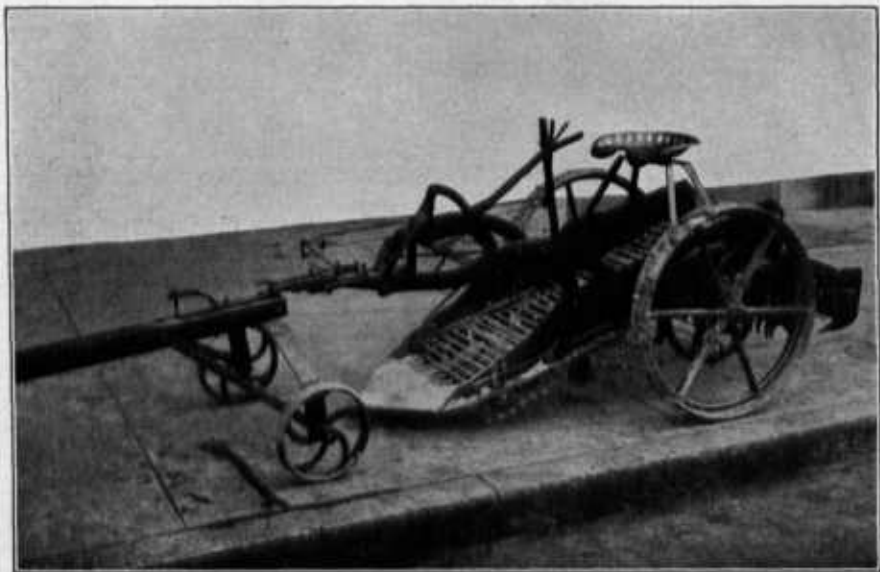


FIG. 10.—Machine potato digger adapted for harvesting peanuts.

The supply of stakes should be ready in advance and may be kept for use from year to year. These stakes should consist of split or round poles about 3 or 4 inches in diameter, 7 feet in length, and sharpened at both ends. For setting the stakes in the ground a pointed bar of iron or a crowbar with which to make the holes is necessary. The stakes should be set in the ground to a depth of 12 to 14 inches and well tamped to make them firm and solid.

Before starting the stack one or two pieces of lath about 18 inches in length are nailed at right angles to the stake 8 inches from the ground, in order to prevent the peanuts coming in direct contact with the soil. In starting to build the stack a few vines are laid across the pieces of lath and the stack then built up by successive layers of vines, the pods being kept well to the center against the

stake and the tops to the outside. The stems should have sufficient outward slope to shed water. Occasionally a few vines should be hung around the stake in order to tie the stack together. By this method the pods will be near the center and around the stake, where there is an upward circulation of air and general protection. When the stack has reached the desired height, a bunch of vines is rolled together and pressed down over the point of the stake to form a top, or a little dry grass or weeds may be used for this purpose.

It is not advisable to use anything for topping out the small stacks that will prevent the circulation of air. A heavy cover or a covering of green or wet hay will invariably cause the peanuts to spoil.



FIG. 11.—Stakes around which stacks of peanut vines are to be built.

The majority of growers follow the practice of placing the stacks singly in rows in the field where the crop is grown; others arrange them in groups of from four to ten, while some growers haul the crop to a stacking yard, where the stacks are built closely together. Figure 11 shows stakes set in the ground and crosspieces nailed on. Figure 12 shows a stack during construction, as well as completed stacks in the background. Figure 13 shows the method of stacking closely together.

Storage in barns is not advisable, either when curing peanuts for market or where the entire plant is fed to stock, as the crop may be

handled more economically and a better grade of hay produced by putting it up in the small stacks. After the peanuts have cured in the stacks from four to six weeks, those intended for feeding to stock may be placed in barns.

PICKING AND CLEANING.

Time of picking.—Peanuts for market should be cured in the stack at least three or four weeks before picking. If the weather is dry and windy immediately after harvesting, the curing process will be quite rapid, but should the weather conditions be unfavorable during this period the pods will ripen more slowly. Too rapid curing is not desir-



FIG. 12.—Laborer building a stack of peanut vines, showing method used. Completed stacks in background.

able, as the pods are likely to shrivel and discolor. Peanuts should not be picked from the vines until the pods have become dry and the peas firm and nutty, with the immature ones more or less shrunken. As a rule very little is to be gained by early marketing, and a better grade of peanuts will be secured if picking is deferred until late autumn. If the pods are not well protected in stacking, many will be destroyed by the common crow. In some sections it is necessary to pick as early as possible to prevent heavy loss from the ravages of field mice and rats while the peanuts are in the stack.

If peanuts are not well stacked the pods are liable to become discolored by the heavy fogs and driving rains of late autumn. The stacks should not be opened nor the vines handled during wet weather.

Picking by hand.—The standard of excellence in the peanut markets is always based upon hand-picked stock, but with the present scarcity of labor and rapid improvement in peanut-picking machinery the time has come when a uniform price is paid for a given quality of peas regardless of how the picking is done.

Figure 14 shows a characteristic group of pickers at work in a peanut field of southern Virginia. Hand picking is at best a dusty and laborious task and is usually done by the women and children.



FIG. 13.—Peanut stacks placed close together near farmyard.

Where the vines are well set with pods a good picker will handle from 8 to 12 bushels a day. The price paid per bushel for picking varies from 8 to 20 cents, according to the quality and variety of peanut, but 10 cents is the ruling price paid for picking Virginias. In some localities the pickers are paid by the hundred pounds, 40 cents a hundred being the average price paid. At this rate the cost of picking the peanuts grown on one acre will vary from \$4 to \$8.

Use of machines for picking.—Two types of machine are employed for picking peanuts from the vines. A cylinder machine similar to a regular grain separator except as to size has been used for several years, especially in the districts where the Spanish variety is extensively grown. The principal objection to all the cylinder

machines is the tendency to break the pods and both shell and injure the peas. By running the cylinder quite slowly, say at 400 revolutions a minute, and feeding properly it is possible to thrash peanuts by using a cylinder machine with a very small percentage of loss from breakage. Pods that are merely cracked or that have what the growers term "oyster mouths" will not keep for a long period but become rancid or are injured by small insects while in storage.

There are machines in use which work upon an entirely different principle from the cylinder machines and which do not break or injure the pods. In these machines the picking is done by dragging



FIG. 14.—Picking peanuts from the vines by hand.

the vines over a horizontal wire mesh, and at the same time brushes act on the lower side of the wire screen to remove the nuts. Very little power is required to operate these machines, two complete outfits being run at once by an 8-horsepower gasoline engine. The capacity of these machines is from 250 to 500 bushels a day. In addition to removing the pods from the vines the machine has the usual cleaning arrangements and a device for removing the small stems from the pods, delivering them in a condition suitable for the cleaning factory. Figure 15 shows one of these machines in operation.

Care of peanuts after picking.—At no time after the curing process should the peanut pods be exposed to water, or even dampness, as

the shells invariably become darkened and discolored by the addition of moisture. When properly cured the shells will be covered with a fine, dry dust, and where this dust becomes moistened it adheres and forms a brownish spot. If the peanuts show the least trace of dampness after their removal from the vines, they should be spread on a floor or stored in a well-ventilated building until thoroughly dry. Many of the larger growers have provided narrow cribs similar to those employed for the storage of corn, and the peanuts are kept in bulk until sold. When the pods are thoroughly dry they may be put into bags as they come from the machine, and either hauled direct to the cleaning factory or stored in small lots.

Preparation of peanuts for market.—As the peanuts come from the hands of the pickers or the thrasher they contain considerable rubbish and have more or less soil adhering to the pods. The extent



FIG. 15.—An improved type of peanut-picking machine in operation.

to which the pods must be cleaned and graded will depend upon the use to which they are to be put; if for vending purposes they will require a factory process, but if for shelled nuts very little work will be necessary to prepare them for the sheller. Under the present status and extent of the peanut industry the cleaning factory has become an important factor, and the interests of the grower and cleaner are correlative and should be cooperative. Where Spanish peanuts are grown on an extensive scale it may be feasible for the farmer to own and operate a small shelling and cleaning outfit. In the case of the large-podded varieties several grades are made from one class of stock, requiring an extensive, although simple, equipment and the handling of large quantities of nuts in order to make the enterprise profitable.

Methods of cleaning peanuts in the factory.—The cleaning or factory process consists chiefly in the removal of all dirt and the separating of the nuts into their respective grades. In addition to grading, the higher class product is treated to a polishing process, which gives the pods a more attractive appearance when exposed for sale. The modern peanut-cleaning factory consists of a four or five story building, which is supplied with power, lighted by electricity, and provided with elevators and bins for handling and storing the unclean nuts. It also has a full equipment of fans, grading machines, polishing drums, and shellers, and an abundance of lower-floor space for the storage of the bags of nuts that are ready for marketing.

When the peanuts are received from the farmer at the factory they are weighed and then elevated to the top floor of the factory. During the cleaning and grading process they descend by gravitation through the fans and graders, are tumbled in the polishing drums together with a small quantity of marble dust to whiten and polish the pods, are passed on slowly moving belts between lines of women who are expert in detecting foreign matter and inferior nuts, and finally drop into bags on the lower floor.

In the modern cleaning factory all dust and refuse is removed by means of fans and ventilators, the portions of sticks, stems, and broken shells being conveyed to the boiler room and fed into the furnace. One advantage of a factory process is that nothing need be wasted, as all broken or split peas can be worked into the stock used in the manufacture of peanut products.

Cleaned vines as stock feed.—The peanut vine or straw from which the nuts have been removed is of considerable value for feeding purposes, being about equal to clover hay. Where the peanuts are picked from the vines by hand the stems become broken and the greater portion of the leaves is lost, but where machines are used for picking it is possible to save the straw in fairly good shape. If the vines are bright and clean after the pods have been removed they can either be sold or fed to farm animals, and they will in this way partly pay for the cost of planting and cultivating the crop. Some growers employ a baling press and bale the straw as it comes from the thrasher in order that it may be more easily stored and also be available for marketing.

VARIETIES OF PEANUTS.

CLASSIFICATION OF TYPES.

Not more than five or six distinct varieties of the peanut are grown in the United States, but these few varieties represent at least three separate types. By classifying the varieties of peanuts according to types we have the large-podded, or Jumbo, peas and the

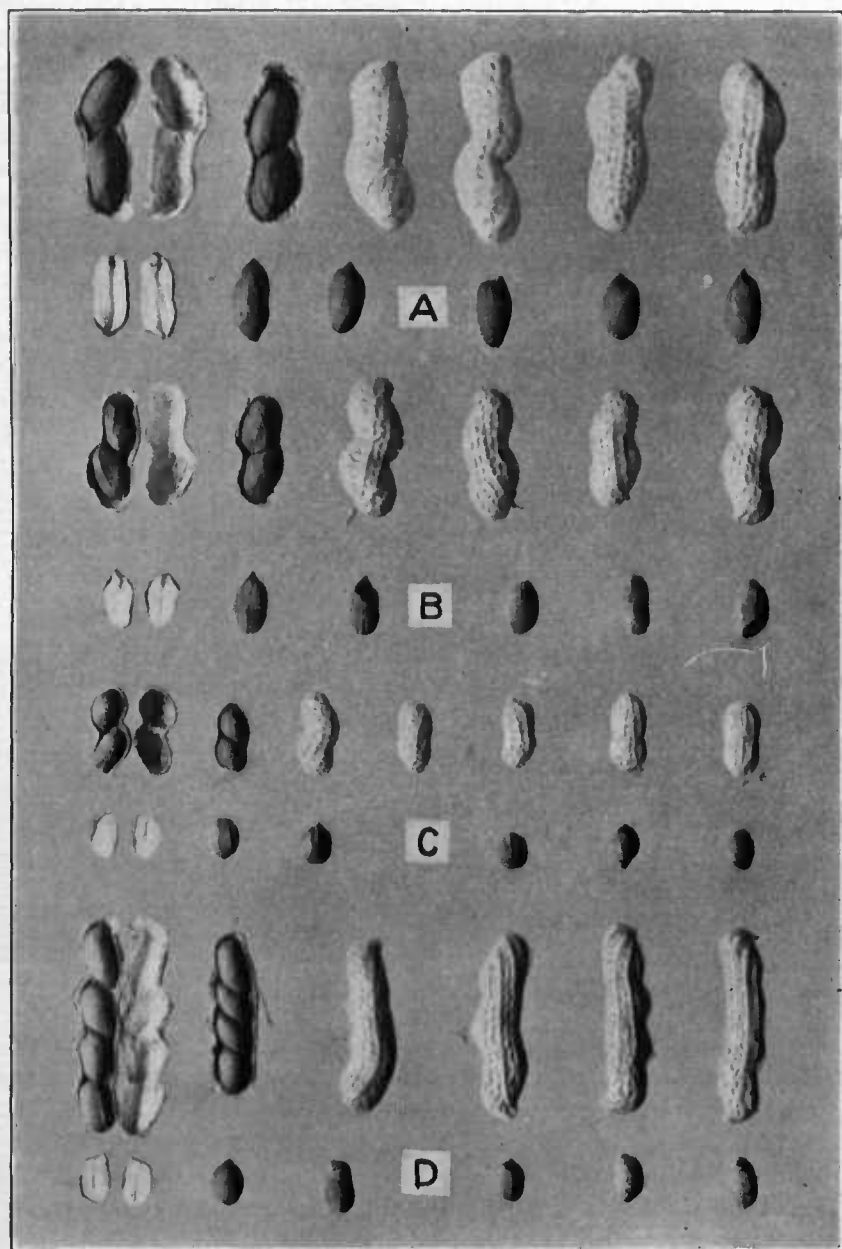


FIG. 16.—Commercial types of peanuts. A, Virginia Bunch, or Virginia Runner; B, African, or North Carolina; C, Spanish; D, Tennessee Red. (About one-half natural size.)

Spanish and African, both small-podded peas. These types are subdivided into bunch and runner peas. Figure 16 shows pods and peas of the more important commercial varieties.

Those varieties having a bunch habit of growth are most generally grown, owing to the fact that they may be planted closer together than the runner varieties. The bunch varieties are also more easily cultivated and harvested than the runner varieties.

DESCRIPTIONS OF VARIETIES.

The following descriptions of the more common varieties of the peanut may be of interest to those not already familiar with them:



FIG. 17.—Virginia Bunch type of peanut.

Virginia Bunch.—Large-podded variety, plant rather dwarf, stems upright, foliage rather light; pods clustered about the base of plant; usually two, sometimes three, seeds in a pod, pod bright and clean, color of peas light brown; pods adhere well to plant in digging. The customary weight per bushel of this variety is 22 pounds. (Fig. 17, and fig. 16, A.)

Virginia Runner.—Large-podded variety, strong grower, stems creeping, foliage heavy; pods scattered along procumbent stems; pods and peas very similar to those of the Virginia Bunch; pods do not adhere well in digging. The customary weight per bushel of this variety is 22 pounds.

Spanish.—Small-podded variety, strong grower, stems upright, foliage abundant and heavy; pods clustered about base of plant; usually two seeds in a pod, entirely filling the pod; color of peas light brown; pods adhere well to plant in digging. This variety frequently yields 60 bushels of marketable peas and a ton of hay to the acre. The peas of this variety are rich in oil content. The weight per bushel of Spanish peanuts is 30 pounds. (Fig. 18; and fig. 16, *C*.)

Tennessee Red.—Small-podded variety; similar to Spanish, except that the pods are longer, sometimes containing five or six peas crowded together; peas dull red in color. This variety is well adapted to stock feeding, but does not sell upon the market owing to the color and quality of the peas. (Fig. 16, *D*.)



FIG. 18.—Spanish type of peanut.

Valencia.—A very promising new variety introduced from Spain. Similar in many respects to the Tennessee Red, but of much better quality. A desirable sort for the manufacture of peanut butter, also blanched and salted peanuts. A heavy yielder and matures in about 120 days.

African, or North Carolina.—A variety that is much grown in Africa for oil production. A very rank grower, the stems spreading over the ground. Foliage dark green and massive. Pods form along the stems similar to the Virginia Runner. The pod is of medium size and generally contains two peas, sometimes three. Rich in oil and of

excellent flavor. This variety requires a long season for its development and should be planted quite early. (Fig. 16, B.)

VARIETIES FOR MARKETING.

For vending purposes, where the peas are roasted and sold from the fruit stands, the large-podded varieties, including Virginia Bunch and Virginia Runner, are in greatest demand, although considerable quantities of Spanish and North Carolina are used for this purpose. For shelled peas the smaller nuts of the large-podded stock are employed; also the greater part of the crop of Spanish, North Carolina, and Tennessee Red varieties. A large percentage of the shelled stock is of the Spanish variety.

VARIETIES FOR STOCK FEEDING.

When peanuts are grown exclusively for feeding purposes the Spanish is undoubtedly to be preferred. If it is desired to market the high-grade portion of the crop and feed the remainder, the question of variety to be grown will depend largely upon locality. Many growers throughout the peanut area follow the practice of planting several acres of Spanish peanuts and disposing of all of the better-grade peas to some factory for shelling purposes, the vines and poorly filled pods being fed to farm animals. The Spanish peanut can be grown under a much broader range of conditions than the large-podded sorts and should be employed where the season is short.

This variety also produces a heavy yield of vine and is desirable for forage purposes. The Valencia is very similar to the Spanish variety in habit of growth, is desirable for stock feeding, and is rapidly finding a place in all branches of the market with the exception of the retail trade in roasted peanuts.

THE USES OF THE PEANUT.

To most persons the peanut suggests only the article as it appears for sale whole or shelled and salted, but during recent years the uses of peanuts have become numerous, and include a wide range of utility. The demand for peanuts for use in the manufacture of food preparations is constantly increasing. By-products of the peanut are now being employed extensively in the manufacture of feeds for farm stock and dairy cows, and the plant is being largely utilized as forage and as a soil renovator.

Important uses for human food.—Among the more important uses of the peanut for human food are the following: It is eaten from the shell, as salted shelled peas, as blanched peas, in the so-called peanut candies and brittle, in combination with pop corn and puffed rice,

in the form of peanut butter, and as an ingredient of peanut and vegetable meats, peanut meal, and salad oils.

The use of the peanut for eating from the shell when roasted is most important and popular, but the quantity of shelled peas that are first roasted and then salted and sold by the pound is constantly increasing.

Comparatively small quantities of the better grades of peanuts are first shelled and then roasted and the thin brown covering removed, after which the halves of the peas are broken apart and the small germ removed, giving the meats a blanched appearance which renders them very desirable for table use.

Great quantities of shelled peas are used every year in the manufacture of peanut candies and brittle, both alone and in combination with other nuts, pop corn, or puffed rice. A very desirable kind of peanut candy can be made by simply boiling shelled peanuts with a thick sirup consisting of 2 pounds of granulated sugar and one large cupful of water, together with a teaspoonful of lemon juice. When the sirup begins to boil add 2 pounds of unroasted shelled peas and cook slowly until the peas are tender and the sirup sufficiently hard to break when quite cold. The cooking process should as a rule continue for about an hour, when the mixture should be poured on a cold buttered platter to cool. Peanut candies as a rule are not adapted to handling in warm weather and should be kept cold after making.

During recent years great quantities of shelled peanuts, especially of the Spanish variety, have been employed for the manufacture of peanut butter. This butter is prepared by the ton in factories, is put up in bottles or tins containing from one-fourth pound to 5 pounds each, and has become very popular as a part of the luncheon menu and for camping and cruising supplies. In the process of the manufacture of peanut butter the peas are first given a medium roast, care being taken that the meats do not become overdone or scorched. The peas are then fanned and screened to remove the thin brown coverings and the germs, after which they are ground to a pulp by means of a special grinder similar to those used for chopping meats. As the peanut pulp comes from the grinder it is fed through a tin tube into the bottles or tins and tightly sealed. Some manufacturers follow the practice of salting the peanut butter, while others leave this part of the process for the consumer, who can easily salt to suit the taste.

By a little experience and the aid of a small meat grinder, any one can make good peanut butter for home use. The peanuts may be roasted before or after shelling, but in either case the oven should be only moderately hot and the peas should be stirred frequently. After

roasting, rub off the skins and screen out the small germs, or hearts. In grinding use the finest plate on the grinder and screw up the tension until the crank will be quite hard to turn. If the pulp is too coarse after one grinding it may be run through a second time. It will not be necessary to add anything but a little salt to the butter, but if desired the butter may be thinned by the addition of a little olive or peanut oil.

In the preparation of vegetarian meats a portion of the oil is expressed from the ground peanuts, other ingredients, including various vegetable substances, are added, and the whole is crushed and pressed into tins ready for use. In this case the extra oil is either used for thinning peanut butter or sold as a compound for use in further cooking the vegetable meats.

Peanut meal, made from finely ground blanched peanut meats, is used to some extent in confections. This meal is especially desirable in the manufacture of almond macaroons and small cakes, to which it imparts the desired almond flavor. It is also used in the manufacture of candies.

Peanut oil is used in the same manner as olive oil; also for mixing with cottonseed oil in order to improve the quality of the cottonseed oil for salad purposes.

The uses of peanut by-products as foods for live stock.—In the factories where peanuts are cleaned, shelled, and graded ready for the market there is always a certain percentage of cleanings and inferior stock that can readily be turned into stock foods. The outside shell, or hull, of the peanut is rich in food materials, but is extremely difficult to reduce to a condition in which it can be fed. In large cleaning factories the shells are generally used as fuel, and the ash resulting therefrom is valuable as a fertilizer, often containing as high as 3 per cent of phosphoric acid, 9 per cent of potash, and 6 per cent of lime.

The thin brown covering of the peas has a feeding value almost equal to that of wheat bran. These hulls are especially desirable for mixing with the smaller particles of broken peas for stock feeding. In large factories where peanuts are prepared for the manufacture of peanut butter and similar preparations the waste in the form of small particles of the meats and the germs is considerable and this is sold to farmers for feeding purposes. In some cases the waste is mixed with a portion of the hulls and finely ground or chopped before leaving the factory. Peanut hulls make an excellent bedding for use in stables, and by using them in this manner and hauling the manure upon the land their full value can be obtained.

Broken peas and germs are used largely as a food for hogs, but both should be fed in moderation and in combination with some

grain, as the peanut fed by itself will produce a hog having soft fat and inferior meat. The famous Smithfield hams and bacon come from hogs that are fed partly on peanuts, the practice being to turn the hogs into the peanut fields after the crop has been gathered and allow them to glean the pods that were lost in harvesting. The principal objection to the use of peanut by-products as stock feed is their tendency to become rancid very quickly. The germs, which are high in nitrogen content, become rancid and bitter in a short while and should not be kept on hand for a greater period than fifty or sixty days.

Possibilities in the manufacture of peanut oil.—The oil of the peanut belongs commercially in the same class as cottonseed and olive oils. Peanut oil is of a higher grade than cottonseed oil and of somewhat lower value than first-class olive oil. Peanut oil is sometimes used for mixing with olive oil for the production of an oil that can be sold at a lower price than pure olive oil. On the other hand, peanut oil is frequently mixed with cottonseed oil in order to improve the quality of the cottonseed oil for certain purposes.

The quantity of oil that may be obtained from the peanut will depend upon the variety, the maturity of the peas, and the apparatus with which the extraction is made. The Spanish meats when shelled and thoroughly cleaned frequently contain as high as 45 per cent of oil, as shown by chemical analysis, although not more than 34 per cent can be expressed by the best of present methods and perhaps about 28 per cent by ordinary machinery. It is generally conceded that in order to make the manufacture of oil profitable good peanuts must be obtainable at prices not exceeding 75 cents a bushel. A bushel of first-class Spanish peanuts, weighing 30 pounds, will produce about 1 gallon of oil, worth 75 cents, and 20 pounds of oil cake and hulls, which when ground and mixed together will be worth approximately 25 cents, or \$25 a ton, as stock feed.

The greater portion of the peanut oil of commerce is manufactured at Marseille, France, from peanuts that are bought very cheaply along the coast regions of Africa and transported by ships as return cargo. The African-grown peanuts are very rich in oil, often containing as high as 50 per cent. With a coming shortage of cottonseed from which to manufacture oil in this country there is a great possibility of building up a peanut-oil industry throughout the cotton belt of the Southern States. As already mentioned, there are thousands of acres of land now lying idle that will produce fairly good crops of peanuts, and their growth will improve the land. By combining the use of cottonseed and peanuts for the production of oil it would be possible to keep the existing oil mills of the South running at a profit to both the farmer and mill owners. The oil

that remains in the cake will not be lost, as there is demand for the cake for fertilizers and for stock feed.

The process of expression is very similar to that for cottonseed oil and the greater portion of the machinery of the present oil mills is adapted to the manufacture of peanut oil.

USE OF THE PEANUT ON THE FARM.

Growing importance.—In sections where the soil and climate are suitable the peanut is rapidly becoming a crop of general farm importance. In the Southern States peanuts can be grown under a



FIG. 19.—Peanuts growing in the alleys between rows of corn.

wide range of conditions, and the product can be used for several purposes. Peanuts are valuable as a substitute for cowpeas, especially on certain soils that are not adapted to the growing of the cowpea. In many sections where the clovers and other soil-renovating crops will not withstand the heat and drought of the summer months the peanut will thrive and make an excellent growth. A crop of peanuts for forage can often be grown after the removal of oats or some other spring crop, and although they may be badly overgrown by crab-grass, the tops may be mown with the grass for hay, and the hogs turned in to root out the peas.

Throughout Georgia and the surrounding Gulf Coast States the peanut is extensively used for planting in the alleys between the rows of corn. The peanuts are planted at the time the corn is given the last working, and are allowed to grow as a catch crop among the corn. (Fig. 19.) After the corn is pulled, cattle are turned in to eat the fodder and the peanut tops. Following the cattle the land is pastured by hogs to clean up everything that remains. In this way most of the nitrogen stored by the peanut roots is left in the soil.

The value of peanut hay for feeding purposes.—The tops of the peanut plant when cut and cured in the same manner as other legumes will produce a hay that is almost equal in feeding value to the best clover hay. By planting the Spanish peanut in rows from 24 to 30 inches apart and quite closely in the row and by giving the crop about two cultivations, it is possible to produce from one to two tons of hay to the acre. After the hay is removed the pods can be turned out by means of a plow, cured, and stored for winter feeding, or hogs may be turned in to gather the crop. The following table shows the comparative value of peanut hay:

TABLE I.—*Comparative analysis of peanut hay and other hays.*

Dry matter.	Protein.	Carbohydrates.	Fats.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Peanut hay.....	11.75	46.95	1.84
Peanut, entire plant.....	13.48	36.28	15.06
Clover hay.....	12.84	48.31	2.11
Timothy hay.....	7.17	52.94	1.97
Cowpea hay.....	19.72	45.15	4.04
Alfalfa hay.....	16.48	42.62	2.03

Peanut straw, consisting of the entire vine after the salable nuts have been removed, has a somewhat higher feeding value than the tops alone, due to the fact that many of the inferior pods are left in the straw. Peanut straw is, however, not so bright or palatable for feeding as are the peanut tops when cut and cured especially for hay.

The value of the entire peanut plant as forage.—Throughout that portion of the Southern States where field corn does not yield a satisfactory crop, the place of corn for feeding to animals may be largely taken by the peanut. On some ranches where a large number of work animals are maintained the Spanish peanut, including the entire plant, is practically the only feed used.

The peanut vines and peas when chopped or ground together form almost a balanced ration for a dairy cow. The following table will give some idea of the comparative value of peanut products and other feeding stuffs:

TABLE II.—*Comparative analysis of peanuts and other feeding materials.*

Dry matter.	Protein.	Carbohy- drates.	Fats.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Ground corn and oats.....	9.6	71.9	4.4
Corn meal.....	9.2	68.7	3.8
Wheat bran.....	15.4	60.4	4.0
Cottonseed meal.....	42.3	23.6	13.1
Peanut kernels.....	26.6	16.7	42.0
Peanut vines.....	10.0	42.0	3.6
Clover hay.....	12.4	33.8	4.5
Alfalfa.....	14.3	42.7	2.2
Peanut, whole plant.....	13.5	36.2	15.0

The use of peanuts for fattening hogs.—As already suggested, the peanut is a valuable feed for use in preparing hogs for market, the usual custom being to turn the hogs into the peanut fields and allow them to glean whatever is left after harvesting. In some sections peanuts are being grown primarily for feeding to hogs. Poorly filled nuts, broken peas, the germs, and waste products generally are fed to hogs during the earlier part of the fattening period. A hog that is fattened exclusively on peanuts will not yield a desirable grade of meat or lard, as the meat will lack firmness and the lard be soft and oily. Toward the end of the fattening period the hog should be fed almost exclusively on corn. Hogs will eat considerable of the peanut tops when pastured on them, and the plan of dividing the field into small areas by portable fences and allowing the hogs to gather the peas is perhaps the most economical.

A method that has been found very satisfactory is first to cut the peanut tops for hay, then turn in hogs. By turning the hogs into the field for a short time only each day, the injury to the soil will not be so great as if they were left in continuously.

Methods of handling and curing peanuts for forage.—Where the entire peanut plant is to be stored and used for feeding to stock the work of curing and caring for the vines should be very much the same as for market purposes, although the crop may be handled very much in the same manner as cowpeas. By experience it has been found most economical to harvest and stack the peanuts in exactly the same manner as already described for market purposes; however, the stacking may or may not be done so carefully.

Peanut vines if handled in the same way as vines of the cowpea yield a very desirable class of forage. Persons who have used the peanut exclusively for feeding purposes claim that they have had

no difficulty in feeding it to all kinds of work animals, even driving horses. It is well, however, to feed only a part ration of peanut vines at first and to observe the animals until they become accustomed to this form of diet. Under ordinary circumstances the plant is fed without removing the nuts, but it may be well in some cases to pick the peanuts from the vines and grind them, shell and all, and then feed as a meal with the vines.

INSECTS INJURIOUS TO THE PEANUT.

The insect enemies of the growing peanut crop have been so few that very little attention has been given them by entomologists. Recently a species of aphid has been reported as working upon the roots of the peanut plants. This insect belongs to a class that obtains its food by sucking the juices of the plant from beneath the surface of the leaves, stems, or roots. The presence of this root aphid is indicated by patches of what appears to be a white mold upon the roots and pods of the peanut and is generally not observed until digging time. Thus far no great injury from these insects is apparent, but should they become very numerous great damage will ensue, and about the only satisfactory remedy which the writer can suggest is crop rotation, planting peanuts on clean land each year, and only returning to the original piece after a period of four or five years.

While in storage peanuts are attacked by various insects. So long as the shells remain unbroken these insects can not gain access to the meats, but where the shells have been injured or broken in thrashing or in subsequent handling the peas can not be kept during the summer months. These insects are especially destructive in storage houses and cleaning factories where peanuts are held for summer trade. They may be destroyed by fumigation with carbon bisulphid in the factory or warehouse. Carbon bisulphid forms an inflammable gas, and its use is attended with some danger and should be applied by an experienced person.^a

DISEASES OF THE PEANUT.

The peanut crop has thus far been remarkably free from disease. About the only disease that has been at all prominent is a form of leaf-spot (*Cercospora personata* (B. & C.) E. & E.) which appears in the form of small brown spots on the leaves. (Fig. 20.)

^a For information regarding the use of this insecticide the reader is referred to Farmers' Bulletin 145, which may be obtained upon application to the Secretary of Agriculture. No general work has been published by this Department on the insect enemies of peanuts, but information in regard to any of them may be obtained by application to the Bureau of Entomology. Correspondence will be facilitated if specimens of the insects concerned in the damage accompany letters of inquiry.

This disease is especially noticeable on the young plants during a wet spring, giving the leaves the appearance of having been scalded by the sun. Later in the season the plants will as a rule outgrow the disease, except in low or poorly drained portions of the fields. Where the disease is abundant upon the foliage the pods are frequently discolored and rusty. There can be no doubt that this disease causes considerable reduction in yield on land that is sour or poorly drained. It is often observed that the disease will be abundant in low spots without spreading to other parts of the field. The presence of the disease upon the foliage of the peanut greatly decreases the value of the vines for hay. Should this trouble become prevalent it may be

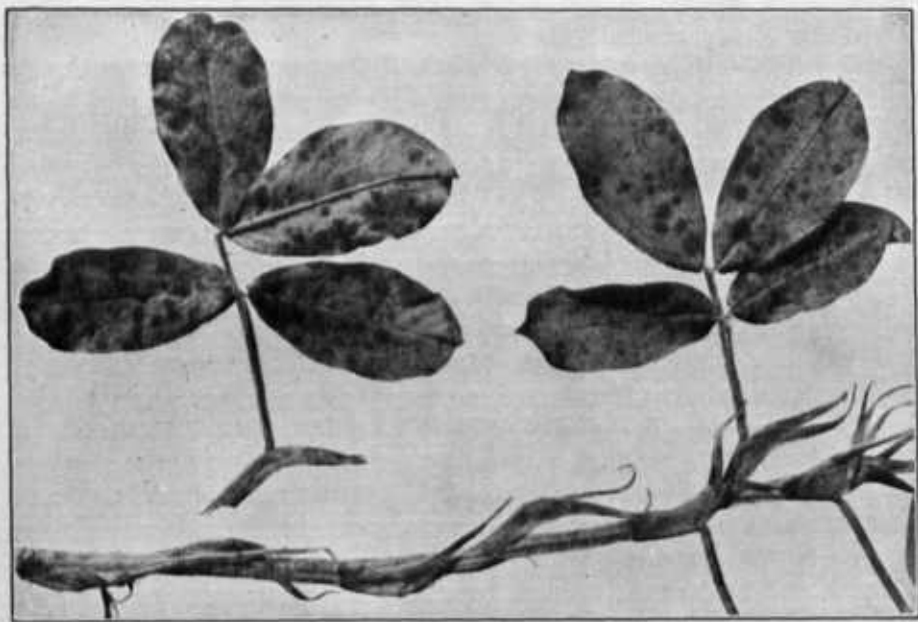


FIG. 20.—Disease appearing upon the leaves of the peanut.

controlled by spraying with Bordeaux mixture. Its development may be prevented by proper drainage.

CONCLUSIONS.

The peanut is worthy of more general cultivation throughout the Southern States, especially in the boll-weevil district, where it will in many cases be found more profitable than cotton.

The uses of peanuts as a general farm crop throughout the Southern States are becoming more numerous, especially as a means of providing suitable forage for range stock during the short winter period.

The demand for peanuts to be used in the preparation of human foods is constantly increasing.

The United States is a heavy buyer of peanut oil that is produced abroad, while there are thousands of acres of waste lands in the Southern States that would produce enough peanuts to keep the cottonseed-oil mills running and furnish more than enough oil for home consumption.

The peanut is a soil builder and renovator. If included in the crop rotation and properly handled, peanuts are not exhaustive of soil fertility.

While the average yield of peanuts is only about 34 bushels an acre, with proper methods a yield of 60 bushels of peas and 1 to 1½ tons of forage may reasonably be expected. There are authentic records of yields of 160 bushels of Spanish peas, together with 2 tons of forage, per acre.

The peanut vines, after the removal of all the first-class peas, have a feeding value practically equal to the cost of the field culture of the crop. An acre of first-class peanuts, calculating the yield at a ton of vines, worth from \$8 to \$10, and 60 bushels of peas, worth \$40 to \$60, will give an income of \$48 to \$70. The cost of growing an acre of peanuts is variously estimated at \$12 to \$25, including seed and fertilizers. These figures show a net return of \$36 to \$45, which is above the average for the crop as now grown in the United States, but decidedly lower than may be expected under favorable conditions and proper cultural methods.

[A list showing the titles of all Farmers' Bulletins available for distribution will be sent free upon application to a Member of Congress or to the Secretary of Agriculture.]

